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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,415	07/29/2003	Todd R. Burkey	XIOT.019PA	5964

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CRAWFORD MAUNU PLLC
1270 NORTHLAND DRIVE, SUITE 390
ST. PAUL, MN 55120

EXAMINER
KIM, DANIEL Y

ART UNIT	PAPER NUMBER
2185	

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/629,415	BURKEY, TODD R.
	Examiner	**Art Unit**	
	Daniel Kim	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>29 July 2003</u>.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-16</u> is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) <u>1-16</u> is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  a) ☐ All b) ☐ Some * c) ☐ None of:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. _____.
    3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).
  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
  Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Objections - Specification

1.   On page 14, line 9, "a host device" is incorrectly referenced as "200". For the

purposes of this action, this reference will be assumed to be for "220".

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1, 2, 4, 6-10 and 14-16 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Stallmo (U.S. Patent No. 5,875,456), in view of Belhadj (US Patent

No. 6,516,425).

For claim 1, Stallmo discloses a program storage device readable by a computer

tangibly embodying one or more programs of instructions executable by the computer to

perform a method for dynamically resizing a disk array in a RAID storage system, the

method comprising:

receiving a request to dynamically resize a disk array in a RAID storage system

(a system to reconfigure itself to allow a disk to be removed or added from the array,

col. 6 lines 5-9);

manipulating RAIDs in the RAID storage system to provide the desired resizing (see col. 6 lines 5-9);

providing the resized disks for operation (disk array that remains on-line with all host data is available for access and modification, col. 6 lines 14-18).

For claim 1, Stallmo does not, however, expressly disclose these steps for a mirrored virtual disk. Belhadj, however, discloses a storage system including a physical storage space of a disk array that is mapped into a virtual storage space according to one or more redundancy schemes, which may include a mirrored redundancy (col. 7, lines 20-28). Belhadj's system uses this virtual mapping information to map a RAID disk array (col. 7 lines 55-64).

Stallmo and Belhadj are analogous art in that they are in the same field of endeavor, that is, a method of managing data in a data storage system. It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize the attaching of RAIDs to a virtual disk for a mirror device because this would allow for varying levels of data availability and system performance and, in the event of a disk or component failure, allow data to be retrieved from an operable portion of the system to regenerate the original data that is lost due to the failure (Stallmo: col. 1 lines 18-20, 28-30).

For claim 2, Stallmo discloses the program storage device of claim 1 wherein the request to dynamically resize a disk array in a RAID storage system is a request to dynamically expand the disk array in a RAID storage system, and wherein the manipulating RAIDs to provide the desired resizing further comprises:

creating an amount of storage necessary by providing RAIDs on each subsystem

(when a new block group is added, the space for the new block group is taken from the

available blocks and reserved for the new block group, col. 18 lines 31-33); and

attaching the RAIDs to a disk system (allow disks that have data... to be

incorporated into the set of managed disks, col. 8 lines 59-61).

For claim 2, Stallmo does not, however, expressly disclose these steps for a

mirrored virtual disk, but this is taught by Belhadj under the same rationale as claim 1.

As for specifying a size for the virtual disk and mapping the size of the virtual disk

directly to all components of the mirror set, Belhadj discloses a disk array that, when

viewed by the user or host application program, an application-level virtual view can

represent a single large storage capacity indicative of the available storage space on

the storage disks within the array (col. 7 lines 66-67 and col. 8 lines 1-5). As a result,

the mapping of the RAID areas in a RAID-level virtual view onto the disks and the

mapping of a front end virtual view to the RAID view are generally in a state of change.

The memory map store maintains the current mapping information used by the RAID

management system to map the RAID areas onto the disks, as well as the information

employed to map between the virtual views (col. 8 lines 8-16).

For claim 4, Stallmo discloses the program storage device of claim 1 wherein the

request to dynamically resize a disk array in a RAID storage system is a request to

dynamically shrink the disk array in a RAID storage system, and wherein the

manipulating the RAIDS to provide the desired resizing further comprises:

detaching any RAIDs that extend beyond the specified size (when an existing

block group is released by the host, blocks are removed from the block group, col. 18

lines 56-58); and

truncating RAIDs to free up any excess physical segments back into the RAID

storage system (all the block space removed from the block group is placed back

into the block pool, col. 18 lines 58-59).

For claim 4, Stallmo does not, however, expressly disclose these steps for a

mirrored virtual disk, or that the specifying a size for the virtual disk and mapping the

size of the virtual disk is performed by an operating system. For these items, see the

combined teachings of Stallmo and Belhadj and rationale for claims 1 and 2 above.

Claim 6 is rejected with the same rationale as claim 2.

As for dynamically expanding mirrored virtual disks, Stallmo discloses the

creating an amount of storage necessary by providing RAIDs on each subsystem (col.

18 lines 31-33) and attaching the RAIDs to the disk system, (col. 8 lines 59-61). See

claim 2 rationale for applying these steps to a mirrored virtual disk, and specifying a size

for the virtual disk and mapping the size of the virtual disk directly to all components of

the mirror set.

Claim 7 is rejected with the same rationale as claim 4.

As for dynamically shrinking mirrored virtual disks, the combined teachings of

Stallmo discloses detaching any RAIDs that extend beyond the specified size (col. 18

lines 56-58) and truncating RAIDs to free up any excess physical segments back into

the RAID storage system (col. 18 lines 58-59). See claim 4 rationale for applying these

steps to a mirrored virtual disk, and specifying a size for the virtual disk and mapping

the size of the virtual disk directly to all components of the mirror set.

Claim 8 is rejected with the same rationale as claim 1. As for a storage system

interface for providing access to a storage system, Stallmo discloses a control module

connected to disks through a SCSI bus (col. 7 lines 38-39).

As for a host side interface for communicating with host devices, Stallmo

discloses a host SCSI bus which connects host computer to control module (col. 7 lines

33-35).

As for a processor, coupled to the host side interface and the storage system

interface, Stallmo discloses a processor that performs the functions of the control

module (col. 8 lines 24-25).

Claim 14 is rejected under the same rationale as claim 8.

Claims 9 and 10, and 15 and 16 are rejected under the same rationales as

claims 2 and 4, respectively.

4.   Claims 3 and 5 are rejected as being unpatentable over Stallmo in view of

Belhadj as applied to claims 2 and 4 respectively, and further in view of Monday (US

PGPub No. 20020133539).

For claims 3 and 5, the combined teachings of Stallmo and Belhadj disclose the

program storage devices of claims 2 and 4, respectively. Stallmo and Belhadj do not,

however, expressly disclose the specifying a size for and mapping the size of a virtual

disk as performed by an operating system for these devices. Monday, however,

discloses an operating system that provides file management and data storage services

including a file system and logical volume manager (LVM) (fig. 3, par. 0025). Monday

also discloses that an LVM is a set of operating system commands, library subroutines,

and other tools by which the administrator establishes and controls disk resources by

mapping the storage capacity of a network attached storage (NAS) server into a

hierarchy of logical structures (par. 0002-0005).

Stallmo, Belhadj and Monday are analogous art in that they are in the same field

of endeavor, that is, a method of managing data in a data storage system. It would have

been obvious to a person of ordinary skill in the art at the time of the invention to utilize

an operating system as a type of management software for the specifying a size for and

mapping the size of a virtual disk because this would allow the operating system to

handle virtual disk management processes that would be difficult to maintain otherwise.

An operating system provides many file management and data storage services

(Monday: par. 0025).

5.   Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Stallmo (U.S. Patent No. 5,875,456), in view of Belhadj (US Patent No. 6,516,425), and

Bobbitt et al (US PGPub No. 20030115218).

For claim 11, the rejection of claim 8 over Stallmo and Belhadj is incorporated

herein. The combined teachings of Stallmo and Belhadj do not expressly disclose a

plurality of hosts or at least one access device, coupled to the plurality of hosts, for

managing data input/output operations, or a storage platform for providing networked

storage to the at least one access device, the storage platform including a management device for dynamically resizing mirrored virtual disks in a RAID storage system. Bobbitt, however, discloses a system with a plurality of underlying file systems running on various file servers to be "virtualized" into one or more "virtual volumes" that appear as a local file system to clients that access the virtual volumes (abstract, see also par. 0008-0009).

Stallmo, Belhadj and Bobbitt are analogous art in that they are in the same field of endeavor, that is, a method of managing data in a data storage system. It would have been obvious to a person of ordinary skill in the art at the time of the invention to extend the proposed storage system of Stallmo and Belhadj to encompass multiple hosts because this would allow for the aggregation of the storage capacity provided to it by the server computers, such that the total capacity of the virtual file system comprises the totality of the storage capacity of the underlying servers, which may be easily scaled by adding additional servers (Bobbitt: par. 0038).

Claims 12 and 13 are rejected under the same rationales as claims 2 and 4, respectively.

Contact Information

6.   Any inquiries concerning this action or earlier actions from the examiner should be directed to Daniel Kim, reachable at 571-272-2742, on Mon-Fri from 10am-5pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan, is also reachable at 571-272-4210.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information from

published applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system, see http://pair-direct.uspto.gov. All questions

regarding access to the Private PAIR system should be directed to the Electronic

Business Center (EBC), reachable at 866-217-9197.

Daniel Kim

Art Unit 2185

10-14-05

MANO PADMANABHAN
SUPERVISORY PATENT EXAMINER